

Supplementary Tables

Table S1: Hand hygiene knowledge of HCWs at NLI of Menoufia University (n=100)

Statement	HCWs with correct response			Test of significance χ^2	p-value
	Doctors (n=35) No. (%)	Nurses (n=65) No. (%)	HCWs (n=100) No. (%)		
Q.14 Which of the following is the main route of cross-transmission of potentially harmful germs between patients in a health-care facility?					
a. Health-care workers' hands when not clean	15 (42.9%)	44 (67.7%)	59 (59%)	5.801	0.01**
Q.15 What is the most frequent source of germs responsible for health care-associated infections?					
c. Germs already present on or within the patient.	13 (37.1%)	25 (38.5%)	38 (38%)	0.017	0.897
Q.16 Which of the following hand hygiene actions prevents transmission of					
a. Before touching a patient (yes)	33 (94.3%)	65 (100%)	98 (98%)	3.79	0.12
b. Immediately after a risk of body fluid exposure (no)	12 (34.3%)	35 (53.8%)	47 (47%)	3.494	0.062
c. After exposure to the immediate surroundings of a patient (yes)	29 (82.9%)	57 (87.7%)	86 (86%)	0.442	0.553
d. Immediately before a clean/aseptic procedure (no)	14 (40%)	34 (52.3%)	48 (48%)	1.381	0.24
Q.17 Which of the following hand hygiene actions prevents transmission of germs to the health-care worker?					
a. After touching a patient (yes)	34 (97.1%)	59 (90.8%)	93 (93%)	1.42	0.416
b. Immediately after a risk of body fluid exposure (yes)	33 (94.3%)	61 (93.8%)	94 (94%)	0.008	1.00
c. Immediately before a clean/aseptic procedure (no)	12 (34.3%)	40 (61.5%)	52 (52%)	6.77	0.009**
d. After exposure to the immediate surroundings of a patient (yes)	24 (68.6%)	53 (81.5%)	77 (77%)	2.16	0.142
Q.18 Which of the following statements on alcohol-based handrub and handwashing with soap and water are true?					
a. Handrubbing is more rapid for hand cleansing than handwashing (true)	32 (91.4%)	49 (75.4%)	81 (81%)	3.805	0.05
b. Handrubbing causes skin dryness more than handwashing (false)	9 (25.7%)	29 (44.6%)	38 (38%)	3.45	0.063
c. Handrubbing is more effective against germs than handwashing (true)	20 (57.1%)	44 (67.7%)	64 (64%)	1.099	0.295
d. Handwashing and handrubbing are recommended to be performed in sequence (false)	19 (54.3%)	18 (27.7%)	37 (37%)	6.902	0.009**
Q.19 What is the minimal time needed for alcohol-based handrub to kill most germs on your hands?					
a. 20 seconds.	23 (66.7%)	52 (80%)	75 (75%)	2.476	0.116
Q.20 Which type of hand hygiene method is required in the following situations?					
a. Before palpation of the abdomen (rubbing)	22 (62.9%)	30 (46.2%)	52 (52%)	2.543	0.111
b. Before giving an injection (rubbing)	26 (74.3%)	23 (35.4%)	49 (49%)	13.776	0.001***
c. After emptying a bedpan (rubbing)	14 (40%)	31 (47.7%)	45 (45%)	0.544	0.461
d. After removing examination gloves (rubbing)	21 (60%)	32 (49.2%)	53 (53%)	1.059	0.303
e. After making a patient's bed (rubbing)	16 (45.7%)	27 (41.5%)	43 (43%)	0.162	0.687
f. After visible exposure to blood (washing)	31 (88.6%)	62 (95.4%)	93 (93%)	1.662	0.236
Q.21 Which of the following should be avoided, as associated with increased likelihood of colonization of hands with harmful germs?					
a. Wearing jewelry (yes)	34 (97.1%)	63 (96.9%)	97 (97%)	0.004	1.00
b. Damaged skin (yes)	34 (97.1%)	59 (90.8%)	93 (93%)	1.42	0.416
c. Artificial fingernails (yes)	33 (94.3%)	60 (92.3%)	93 (93%)	0.137	1.00
d. Regular use of a hand cream (no)	22 (62.9%)	38 (58.5%)	60 (60%)	0.183	0.669
Level of knowledge					
Poor (<60%)	8 (22.9%)	18 (27.7%)	26 (26%)	$\chi^2 = 1.460$	0.482
Moderate (60-79%)	23 (65.7%)	35 (53.8%)	58 (58%)		
Good (80-100%)	4 (11.4%)	12 (18.5%)	16 (16%)		
Total knowledge score					
Min-Max	9-25	10-25	9-25	Mann-Whitney Test= 0.662	0.508
Mean±SD	16.4(±3.5)	16.8(±3.1)	16.7(±3.2)		
Median (IQR)	16 (15-17)	17(14-19)	16 (14-18)		

IQR inter-quartile range. *Statistical significance, $P < 0.05$. ** Highly statistical significance, $P < 0.001$.

Table S2: Hand hygiene perception of HCWs at NLI of Menoufia University (n=100)

Statement	HCWs with their response			Test of significance LH R test	p-value
	Doctors (n=35) No. (%)	Nurses (n=65) No. (%)	HCWs (n=100) No. (%)		
Q.14 In your opinion, what is the average percentage of hospitalised patients who will develop a health care-associated infection (between 0 and 100%)? Median (IQR)	60 (50-70) %	60(40-70) %	60(45.3-70) %	Mann-Whitney Test= 0.627	0.531
Q.15 In general, what is the impact of a health care-associated infection on a patient's clinical outcome?					
Very low	0 (0%)	1 (1.5%)	1 (1%)	17.33	0.001**
Low	0 (0%)	18 (27.7%)	18 (18%)		
High	26 (74.3%)	40 (61.5%)	66 (66%)		
Very high	9 (25.7%)	6 (9.2%)	15 (15%)		
Q.16 What is the effectiveness of hand hygiene in preventing health care-associated infection?					
Very low	0 (0%)	0 (0%)	0 (0%)	5.312	0.044*
Low	1 (2.9%)	0 (0%)	1 (1%)		
High	22 (62.9%)	29 (44.6%)	51 (51%)		
Very high	12 (34.3%)	36 (55.4%)	48 (48%)		
Q.17 Among all patient safety issues, how important is hand hygiene at your institution?					
Low priority	0 (0%)	0 (0%)	0 (0%)	χ ² =2.904	0.25
Moderate	8 (22.9%)	7 (10.8%)	15 (15%)		
High	11 (31.4%)	20 (30.8%)	31 (31%)		
Very high	16 (45.7%)	38 (58.5%)	54 (54%)		
Q.18 On average, in what percentage of situations requiring hand hygiene do health-care workers in your hospital actually perform hand hygiene, either by handrubbing or handwashing (between 0 and 100%)? Median (IQR)	50(40-70) %	90 (55-100) %	70 (50-95) %	Mann-Whitney Test= 3.949	0.001**
Q.19 In your opinion, how effective would the following actions be to improve hand hygiene permanently in your institution?					
a. Leaders and senior managers at your institution support and openly promote hand hygiene.					
1 (not effective)	2 (5.7%)	1 (1.5%)	3 (3%)	15.7	0.008**
2	1 (2.9%)	2 (3.1%)	3 (3%)		
3	6 (17.1%)	4 (6.2%)	10 (10%)		
4	4 (11.4%)	7 (10.8%)	11 (11%)		
5	6 (17.1%)	5 (7.7%)	11 (11%)		
6	7 (20%)	5 (7.7%)	12 (12%)		
7 (very effective)	9 (25.7%)	41 (63.1%)	50 (50%)		
b. The health-care facility makes alcohol-based handrub always available at each point of care.					
1 (not effective)	0 (0%)	2 (3.1%)	2 (2%)	19.924	0.001*
2	1 (2.9%)	3 (4.6%)	4 (4%)		
3	6 (17.1%)	1 (1.5%)	7 (7%)		
4	5 (14.3%)	2 (3.1%)	7 (7%)		
5	3 (8.6%)	9 (13.8%)	12 (12%)		
6	9 (25.7%)	7 (10.8%)	16 (16%)		
7 (very effective)	11 (31.4%)	41 (63.1%)	52 (52%)		

Table S2 (cont'n): Hand hygiene perception of HCWs at NLI of Menoufia University (n=100)

Statement	HCWs with their response			Test of significance LH R test	p-value
	Doctors (n=35)	Nurses (n=65)	HCWs (n=100)		
	No. (%)	No. (%)	No. (%)		
c. Hand hygiene posters are displayed at point of care as reminders.					
1 (not effective)	0 (0%)	2 (3.1%)	2 (2%)	20.812	0.001*
2	2 (5.7%)	4 (6.2%)	6 (6%)		
3	3 (8.6%)	3 (4.6%)	6 (6%)		
4	14 (40%)	5 (7.7%)	19 (19%)		
5	1 (2.9%)	7 (10.8%)	8 (8%)		
6	8 (22.9%)	11 (16.9%)	19 (19%)		
7 (very effective)	7 (20%)	33 (50%)	40 (40%)		
d. Each health-care worker receives education on hand hygiene.					
1 (not effective)	3 (8.6%)	4 (6.2%)	7 (7%)	7.034	0.303
2	1 (2.9%)	3 (4.6%)	4 (4%)		
3	2 (5.7%)	3 (4.6%)	5 (5%)		
4	8 (22.9%)	7 (10.8%)	15 (15%)		
5	6 (17.1%)	5 (7.7%)	11 (11%)		
6	2 (5.7%)	9 (13.8%)	11 (11%)		
7 (very effective)	13 (37.1%)	34 (52.3%)	47 (47%)		
e. Clear and simple instructions for hand hygiene are made visible for every health-care worker.					
1 (not effective)	4 (11.4%)	3 (4.6%)	7 (7%)	13.478	0.02*
2	1 (2.9%)	1 (1.5%)	2 (2%)		
3	2 (5.7%)	1 (1.5%)	3 (3%)		
4	4 (11.4%)	7 (10.8%)	11 (11%)		
5	7 (20%)	5 (7.7%)	12 (12%)		
6	9 (25.7%)	11 (16.9%)	20 (20%)		
7 (very effective)	8 (22.9%)	37 (56.9%)	45 (45%)		
f. Health-care workers regularly receive feedback on their hand hygiene performance.					
1 (not effective)	7 (20%)	1 (1.5%)	8 (8%)	38.848	0.001**
2	5 (14.3%)	3 (4.6%)	8 (8%)		
3	3 (8.6%)	3 (4.6%)	6 (6%)		
4	13 (37.1%)	6 (9.2%)	19 (19%)		
5	2 (5.7%)	9 (13.8%)	11 (11%)		
6	3 (8.6%)	10 (15.4%)	13 (13%)		
7 (very effective)	2 (5.7%)	33 (50.8%)	35 (35%)		
g. You always perform hand hygiene as recommended (being a good example for your colleagues).					
1 (not effective)	2 (5.7%)	0 (0%)	2 (2%)	14.401	0.01*
2	3 (8.6%)	0 (0%)	3 (3%)		
3	1 (2.9%)	1 (1.5%)	2 (2%)		
4	6 (17.1%)	7 (10.8%)	13 (13%)		
5	6 (17.1%)	5 (7.7%)	11 (11%)		
6	5 (14.3%)	18 (27.7%)	23 (23%)		
7 (very effective)	12 (34.3%)	34 (52.3%)	46 (46%)		
h. Patients are invited to remind health-care workers to perform hand hygiene.					
1 (not effective)	14 (40%)	15 (23.1%)	29 (29%)	9.492	0.137
2	7 (20%)	6 (9.2%)	13 (13%)		
3	1 (2.9%)	5 (7.7%)	6 (6%)		
4	4 (11.4%)	9 (13.8%)	13 (13%)		
5	3 (8.6%)	5 (7.7%)	8 (8%)		
6	4 (11.4%)	10 (15.4%)	14 (14%)		
7 (very effective)	2 (5.7%)	15 (23.1%)	17 (17%)		

Table S2 (cont'n): Hand hygiene perception of HCWs at NLI of Menoufia University (n=100)

Statement	HCWs with their response			Test of significance LH R test	p-value
	Doctors (n=35) No. (%)	Nurses (n=65) No. (%)	HCWs (n=100) No. (%)		
Q.20 What importance does the head of your department attach to the fact that you perform optimal hand hygiene?					
1 (no importance)	1 (2.9%)	2 (3.1%)	3 (3%)	12.309	0.038*
2	3 (8.6%)	1 (1.5%)	4 (4%)		
3	2 (5.7%)	6 (9.2%)	8 (8%)		
4	4 (11.4%)	5 (7.7%)	9 (9%)		
5	7 (20%)	5 (7.7%)	12 (12%)		
6	8 (22.9%)	8 (12.3%)	16 (16%)		
7 (very high importance)	10 (28.6%)	38 (58.5%)	48 (48%)		
Q.21 What importance do your colleagues attach to the fact that you perform optimal hand hygiene?					
1 (no importance)	2 (5.7%)	5 (7.7%)	7 (7%)	6.11	0.409
2	3 (8.6%)	1 (1.5%)	4 (4%)		
3	3 (8.6%)	3 (4.6%)	6 (6%)		
4	5 (14.3%)	11 (16.9%)	16 (16%)		
5	7 (20%)	7 (10.8%)	14 (14%)		
6	6 (17.1%)	13 (20%)	19 (19%)		
7 (very high importance)	9 (25.7%)	25 (38.5%)	34 (34%)		
Q.22 What importance do patients attach to the fact that you perform optimal hand hygiene?					
1 (no importance)	6 (17.1%)	10 (15.4%)	16 (16%)	5.975	0.429
2	5 (14.3%)	4 (6.2%)	9 (9%)		
3	6 (17.1%)	4 (6.2%)	10 (10%)		
4	3 (8.6%)	8 (12.3%)	11 (11%)		
5	3 (8.6%)	7 (10.8%)	10 (10%)		
6	4 (11.4%)	13 (20%)	17 (17%)		
7 (very high importance)	8 (22.9%)	19 (29.2%)	27 (27%)		
Q.23 How do you consider the effort required by you to perform good hand hygiene when caring for patients?					
1 (no effort)	6 (17.1%)	18 (27.7%)	24 (24%)	2.769	0.863
2	6 (17.1%)	7 (10.8%)	13 (13%)		
3	2 (5.7%)	3 (4.6%)	5 (5%)		
4	3 (8.6%)	7 (10.8%)	10 (10%)		
5	3 (8.6%)	4 (6.2%)	7 (7%)		
6	4 (11.4%)	9 (13.8%)	13 (13%)		
7 (a big effort)	11 (31.4%)	17 (26.2%)	28 (28%)		
Q.24 On average, in what percentage of situations requiring hand hygiene do you actually perform hand hygiene, either by handrubbing or handwashing (between 0 and 100%)? Median (IQR)	70 (50-85) %	95 (80-100) %	87 (66.25-99.75) %	Mann-Whitney Test=-4.101	0.001**
Level of perception					
Poor (<60%)	10 (28.6%)	5 (7.7%)	15 (15%)	χ ² = 16.835	0.001*
Moderate (60-79%)	22 (62.9%)	31 (47.7%)	53 (53%)		
Good (80-100%)	3 (8.6%)	29 (44.6%)	32 (32%)		
Total perception score					
Min-Max	30-75	35-84	30-84	t-test=-4.466	0.001**
Mean±SD	54.97±10.7	65.3±11.23	61.7±12.1		
Median (IQR)	57 (50-62)	66 (58-72)	63 (53-71)		

*Statistical significance, $P < 0.05$. ** Highly statistical significance, $P < 0.001$.