

THE LANCET Infectious Diseases

Supplementary appendix

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

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Supplementary webappendix

Supplement to: Stewardson, Sax, Gayet-Ageron *et al.* Performance feedback and patient participation to improve healthcare worker hand hygiene compliance in the setting of established multimodal promotion: a cluster randomised controlled trial.

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Supplementary Table 1. Components of hand hygiene promotion at the University of Geneva Hospitals.

The Infection Control Programme was created in October 1992 and consists of a senior head physician, four senior physicians, several research associates, a head nurse, fourteen infection control nurses (11.8 FTE), a biomedical engineer, a medical microbiologist, project managers, a data manager and secretarial staff.

Main components of hand hygiene promotion are presented below:

System change <ul style="list-style-type: none">• ABHR (rinse and gel formulations) available at the point of care in individual pocket-sized bottles carried by HCWs, equipment trolleys and patient rooms• Wall-mounted ABHR dispensers (rinse formulation) available at strategically identified locations in corridors, facilities rooms, nursing stations, treatment and patient rooms• Sinks, soap, paper towels and skin conditioners available throughout the hospital
Education and training <ul style="list-style-type: none">• Infection control service as described in the text• Mandatory basic infection control course for all HCWs (VigiGerme®)• VigiGerme® intranet site – access to education materials and infection control protocols• Mobile VigiBox® – device for interactive HCW hand hygiene training (UV-light and fluorescein)• Specific promotional activities each year, on 5 May (WHO Hand Hygiene in healthcare Day)
Monitoring and feedback <ul style="list-style-type: none">• Direct observation of hand hygiene compliance by trained, validated infection control nurses• Occasional informal verbal feedback to HCWs following observation sessions, at the discretion of the auditors• Annual feedback of hand hygiene compliance rates to the executive board as a quality indicator• Annual feedback of hand hygiene compliance rates to the clinical departments heads and directors of nursing and medical services• ABHR product consumption recorded per ward, but not routinely fed back to HCWs
Reminders in the workplace <ul style="list-style-type: none">• Posters throughout hospital – promotion, indications and technique• “Ô les mains!” hand hygiene promotion video displayed on large screen in main hospital entrance and other locations (since 2009)• Widely distributed “ID zingers” with retractable cord to attach ID badge to uniform
Institutional safety climate <ul style="list-style-type: none">• Hand hygiene “team” consisting of specific staff responsible for the promotion of hand hygiene• Clear commitment to hand hygiene made by hospital leadership• Prominent annual active participation in WHO May 5 Save Lives Clean Your Hands• Annual monitoring of the WHO Hand Hygiene Self-Assessment Framework

HCW, healthcare worker; HH, hand hygiene; ABHR, alcohol-based handrub

Supplementary Table 2. Patient indications for hand hygiene.

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1. Before and after eating
 2. After going to the toilet
 3. After blowing your nose
 4. When you leave and return to your space (bed and bedside table)
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Supplementary Table 3. Hand hygiene performance overall and with WHO Moment 1 stratified by profession, University of Geneva Hospitals, April 2009 to June 2012.

	No. of Hand Hygiene Actions	No. of Hand Hygiene Opportunities	Mean Compliance % (95% CI)*	p value†	p value‡
Global hand hygiene					
Among nurses					
Control					ref.
Baseline	557	807	71.6 (66.8-75.9)		
Intervention	961	1273	76.9 (73.1-80.3)	0.01	
Enhanced performance feedback					0.59
Baseline	615	901	70.0 (65.6-74.1)		
Intervention	1372	1806	76.9 (73.6-79.9)	0.0001	
Enhanced performance feedback plus patient participation					0.02
Baseline	531	802	68.0 (63.2-72.8)		
Intervention	1226	1532	80.6 (77.4-83.5)	0.0001	
Among auxiliary					
Control					ref.
Baseline	210	310	68.1 (61.2-74.3)		
Intervention	443	597	74.6 (69.5-79.0)	0.048	
Enhanced performance feedback					0.06
Baseline	187	311	61.0 (54.3-67.4)		
Intervention	491	650	76.4 (71.9-80.4)	0.0001	
Enhanced performance feedback plus patient participation					0.85
Baseline	228	365	62.5 (56.1-68.5)		
Intervention	467	605	78.2 (73.7-82.2)	0.0001	
Among doctors					
Control					ref.
Baseline	144	271	56.5 (45.9-66.6)		
Intervention	190	298	66.4 (56.8-74.9)	0.02	
Enhanced performance feedback					0.50
Baseline	213	363	60.8 (51.7-69.3)		
Intervention	237	376	66.6 (57.6-74.6)	0.15	
Enhanced performance feedback plus patient participation					0.51
Baseline	230	371	62.4 (52.8-71.1)		
Intervention	368	565	64.6 (55.9-72.4)	0.55	
Among other profession					
Control					ref.
Baseline	24	42	60.7 (41.9-76.8)		
Intervention	37	71	52.2 (37.0-67.0)	0.46	
Enhanced performance feedback					0.04
Baseline	25	54	43.2 (28.4-59.4)		
Intervention	60	88	65.9 (51.8-77.7)	0.02	
Enhanced performance feedback plus patient participation					0.42
Baseline	35	56	62.8 (47.0-76.3)		
Intervention	46	75	72.9 (58.2-83.9)	0.28	
WHO Moment 1: Before patient contact					
Among nurses					
Control					ref.
Baseline	114	213	58.3 (48.7-67.2)		
Intervention	194	312	64.2 (56.1-71.6)	0.20	
Enhanced performance feedback					0.34
Baseline	117	243	52.1 (43.4-60.6)		

Intervention	294	442	69.4 (62.7-75.4)	<0.0001	
Enhanced performance feedback plus patient participation					0.18
Baseline	87	188	49.2 (39.9-58.6)		
Intervention	246	359	70.1 (63.0-76.4)	<0.00001	
Among auxiliary					
Control					ref.
Baseline	46	87	53.1 (41.5-64.4)		
Intervention	85	150	56.6 (47.4-65.4)	0.62	
Enhanced performance feedback					0.10
Baseline	33	84	39.1 (28.6-50.8)		
Intervention	92	151	61.4 (52.4-69.7)	0.001	
Enhanced performance feedback plus patient participation					0.15
Baseline	41	97	41.4 (31.2-52.3)		
Intervention	78	137	57.4 (47.9-66.4)	0.02	
Among doctors					
Control					ref.
Baseline	48	106	47.3 (32.2-62.8)		
Intervention	63	115	60.9 (46.0-73.9)	0.08	
Enhanced performance feedback					0.31
Baseline	86	147	58.0 (44.4-70.4)		
Intervention	67	124	56.6 (42.3-76.3)	0.85	
Enhanced performance feedback plus patient participation					0.89
Baseline	62	128	48.7 (34.5-63.2)		
Intervention	134	226	59.6 (46.7-71.2)	0.10	
Among other profession					
Control					ref.
Baseline	8	18	46.3 (23.2-71.1)		
Intervention	13	27	46.7 (26.7-67.8)	0.98	
Enhanced performance feedback					0.66
Baseline	8	20	38.2 (18.5-62.6)		
Intervention	20	33	58.3 (37.9-76.3)	0.18	
Enhanced performance feedback plus patient participation					0.93
Baseline	9	19	47.9 (25.6-71.0)		
Intervention	12	21	56.0 (33.0-76.7)	0.63	

*Obtained from a generalised linear mixed model with the ward included as random effect. †Comparison of intervention effect inside each arm plus effect of an interaction between time period and the randomization arm. ‡Effect of enhanced performance feedback and patient participation then of enhanced performance feedback alone compared to the control arm.

Note: Overall effect of patient participation alone when enhanced performance feedback was compared to enhanced performance feedback alone among nurses, $p=0.02$; auxiliary, $p=0.85$; doctors, $p=0.51$ and other professions, $p=0.42$. Effect of patient participation alone when enhanced performance feedback was compared to enhanced performance feedback alone and restricted on Moment 1: among nurses, $p=0.56$; auxiliary, $p=0.52$; doctors, $p=0.21$ and other professions, $p=0.59$.

Supplementary Table 4. Hand hygiene performance stratified by WHO Moments, University of Geneva Hospitals, April 2009 to June 2012.

	No. of Hand Hygiene Actions	No. of Hand Hygiene Opportunities	Mean Compliance % (95% CI)*	p value†	p value‡
Global hand hygiene					
Among moment 1					
Control					ref.
Baseline	216	424	54.8 (47.1-62.2)	0.08	
Intervention	355	604	60.6 (53.7-67.2)		
Enhanced performance feedback					0.06
Baseline	244	494	51.4 (44.4-58.2)	<0.0001	
Intervention	473	750	65.4 (59.3-71.0)		
Enhanced performance feedback plus patient participation					0.01
Baseline	199	432	47.7 (40.5-55.0)	<0.0001	
Intervention	470	743	65.4 (59.2-71.1)		
Among moment 2					
Control					ref.
Baseline	105	170	66.0 (55.8-75.0)	0.47	
Intervention	168	248	69.6 (60.7-77.1)		
Enhanced performance feedback					0.65
Baseline	99	168	60.6 (50.6-69.8)	0.14	
Intervention	222	341	67.4 (59.6-74.4)		
Enhanced performance feedback plus patient participation					0.56
Baseline	134	198	71.6 (62.0-79.6)	0.93	
Intervention	201	285	71.2 (63.1-78.1)		
Among moment 3					
Control					ref.
Baseline	140	165	86.1 (78.6-91.3)	0.10	
Intervention	166	210	79.5 (71.6-85.6)		
Enhanced performance feedback					0.25
Baseline	110	133	84.2 (75.9-90.1)	0.99	
Intervention	196	236	84.3 (77.8-89.2)		
Enhanced performance feedback plus patient participation					<0.0001
Baseline	135	182	73.7 (64.3-81.3)	<0.0001	
Intervention	219	244	90.2 (84.8-93.8)		
Among other moment 4					
Control					ref.
Baseline	332	478	71.2 (65.3-76.5)	<0.0001	
Intervention	627	775	81.8 (77.8-85.3)		
Enhanced performance feedback					0.47
Baseline	428	570	75.8 (70.9-80.0)	<0.001	
Intervention	874	1056	83.2 (79.8-86.1)		
Enhanced performance feedback plus patient participation					0.93
Baseline	384	520	74.8 (69.5-79.4)	<0.00001	
Intervention	823	980	84.6 (81.2-87.4)		
Among other moment 5					
Control					ref.
Baseline	142	193	73.9 (65.4-80.9)	0.28	
Intervention	315	402	78.1 (71.9-83.2)		
Enhanced performance feedback					0.16
Baseline	159	264	61.7 (53.9-68.9)	<0.001	

Intervention	395	537	74.8 (69.1-79.7)	
Enhanced performance feedback plus patient participation				0.25
Baseline	172	262	66.4 (58.5-73.5)	0.001
Intervention	394	515	77.4 (71.9-82.1)	

*Obtained from a generalised linear mixed model with the ward included as random effect. †Comparison of intervention effect inside each arm plus effect of an interaction between time period and the randomization arm. ‡Effect of enhanced performance feedback and patient participation then of enhanced performance feedback alone compared to the control arm.

Note: Effect of patient participation alone when enhanced performance feedback was compared to enhanced performance feedback alone among Moment 1, p=0.41; Moment 2, p=0.29; Moment 3, p=0.004; Moment 4, p=0.41; Moment 5, p=0.79.

Supplementary Table 5. Organisms causing primary bloodstream infections, stratified by study period and arm.

Study period	Study arm		
	Control	Feedback	FB PP
Baseline			
<i>S. aureus</i>	12	12	18
Coagulase-negative <i>Staphylococcus</i>	13	17	15
<i>Enterococcus</i> spp.	12	11	9
<i>Streptococcus</i> spp.	4	4	2
<i>Escherichia coli</i>	10	10	14
<i>Klebsiella</i> spp.	4	9	5
Other Enterobacteriaceae	4	1	6
<i>Pseudomonas</i> spp.	3	5	9
<i>Candida</i> spp.	2	4	1
Other	4	8	7
Intervention			
<i>S. aureus</i>	9	8	13
Coagulase-negative <i>Staphylococcus</i>	6	34	17
<i>Enterococcus</i> spp.	12	12	16
<i>Streptococcus</i> spp.	3	8	6
<i>Escherichia coli</i>	10	23	16
<i>Klebsiella</i> spp.	4	14	5
Other Enterobacteriaceae	10	9	8
<i>Pseudomonas</i> spp.	5	6	5
<i>Candida</i> spp.	0	4	4
Other	4	23	12

Supplementary Table 6. Results of quarterly audits of intervention wards. These results demonstrate healthcare workers' awareness of interventions that were active in their ward, stratified by study arm and healthcare worker profession.

Ward allocation	Response	Profession			All
		Nurses	Nursing assistants	Doctors	
Performance feedback					
	No intervention	52 (37.7)	34 (50.0)	23 (63.9)	109 (45.0)
	Performance feedback	85 (61.6)	33 (48.5)	13 (36.1)	131 (54.1)
	Patient participation	1 (0.7)	1 (1.5)	0 (0.0)	2 (0.8)
	Both interventions	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Performance feedback + Patient participation					
	No intervention	23 (14.1)	18 (21.7)	46 (70.8)	87 (28.0)
	Performance feedback	5 (3.1)	4 (4.8)	2 (3.1)	11 (3.5)
	Patient participation	83 (50.9)	50 (60.2)	13 (20.0)	146 (46.9)
	Both interventions	52 (31.9)	11 (13.3)	4 (6.2)	67 (21.5)

All results are provided as count (%)

Supplementary Figure 1. Front and back sides of the individual feedback card distributed to healthcare workers at the end of observation sessions in the intervention groups.



Translation of key sentences:

French original	English translation
Voici vos résultats	Here are your results
Vous avez eu [blank] occasions d'effectuer l'hygiène des mains, et vous avez réalisé ce geste [blank] fois. Votre observance à l'hygiène des mains est de:	You had [blank] opportunities to perform hand hygiene, and you did it [blank] times. Your hand hygiene compliance is:
Nous vous remercions de votre participation et n'oubliez pas: l'hygiène des mains au cours de soins est une garantie pour le patient.	We thank you for your participation and don't forget: hand hygiene in health care is critical for patient safety.
Sur la base de vos résultats, nous vous encourageons à améliorer votre hygiène des mains au(x) moments(s) suivants:	Based on your results, we encourage you to improve your hand hygiene at the following moments(s):

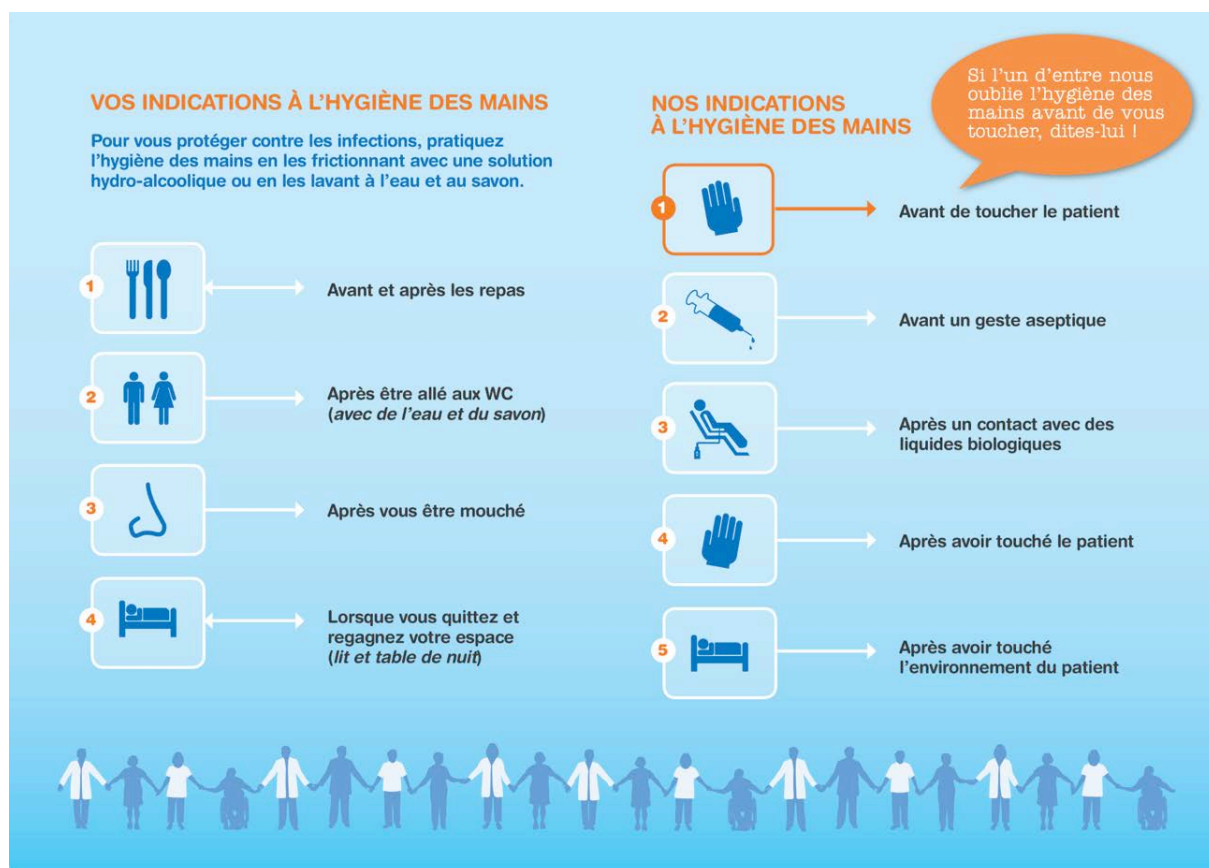
Supplementary Figure 2. An example of the feedback posters distributed in the intervention groups each quarter.



Translation of key sentences:

French original	English translation
L'hygiène des mains a été correctement effectuée 8 fois sur 10.	Hand hygiene was performed correctly 8 times out of 10.
Moyenne de votre département	Average in your department
Moyenne aux HUG	Average at HUG
Votre tendance	Your trend
Créez l'émulation dans votre équipe et fixez ensemble votre nouvel objectif.	Develop a spirit of competition within your team and select a new target.
[Blank] fois sur 10 pour le trimestre prochain	[Blank] times out of 10 for the next quarter

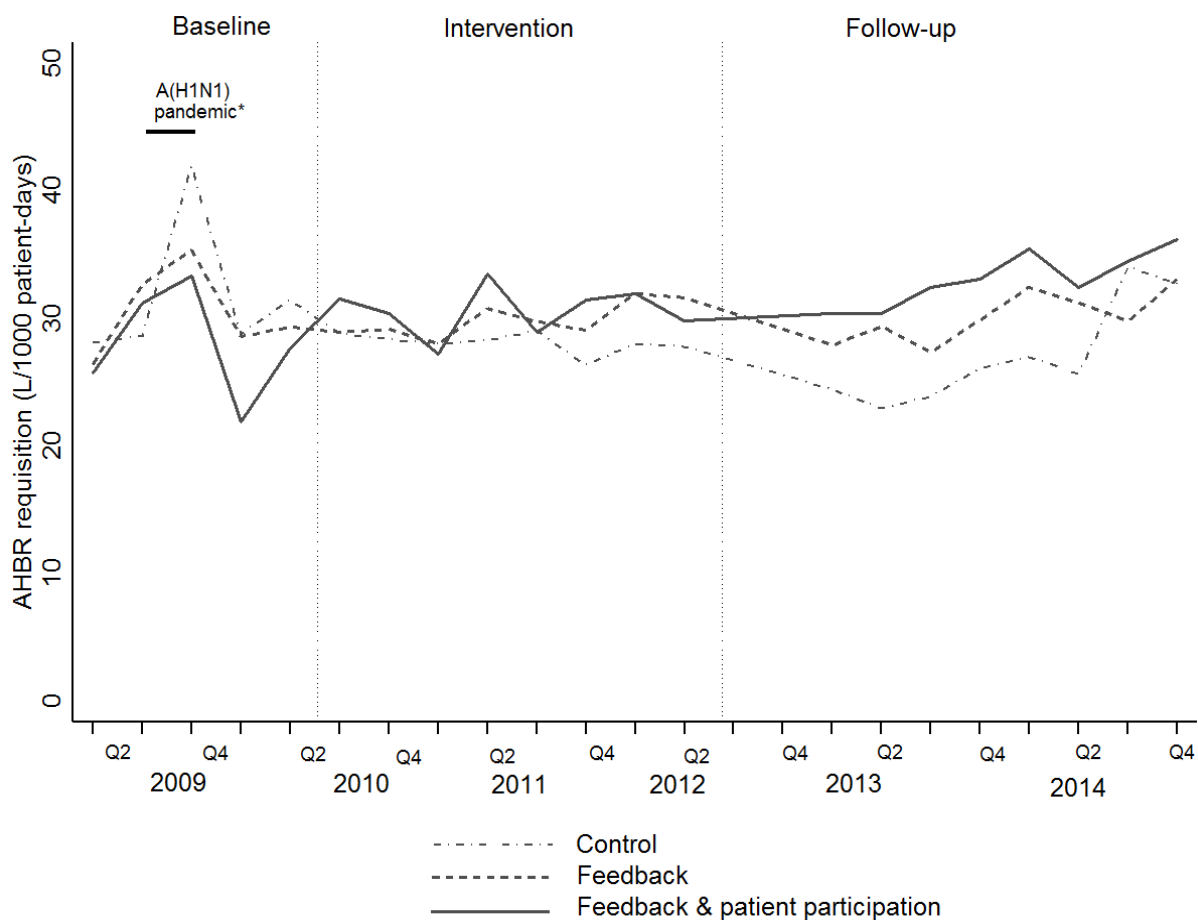
Supplementary Figure 3. The inside pages of the brochure that was included in the Welcome Kit provided to patients admitted to patient participation wards.



Translation of key sentences:

French original	English translation
Vos indications à l'hygiène des mains	Your indications for hand hygiene
Pour vous protéger contre les infections, pratiquez l'hygiène des mains en les frictionnant avec une solution hydro-alcoolique ou en les lavant à l'eau et au savon.	To protect yourself from infections, perform hand hygiene by rubbing with an alcohol-based handrub or washing with soap and water.
Avant et après les repas	Before and after meals
Après être allé aux WC (avec de l'eau et du savon)	After going to the toilet (with soap and water)
Après vous être mouché	After blowing your nose
Lorsque vous quittez et regagnez votre espace (lit et table de nuit)	When you leave and return to your space (bed and side table)
Si l'un d'entre nous oublie l'hygiène des mains avant de vous toucher, dites-lui !	If one of us forgets to perform hand hygiene before touching you, remind us!

Supplementary Figure 4: Quarterly alcohol-based handrub requisition in the baseline, intervention and follow-up periods in the three study arms; University of Geneva Hospitals, April 2009 to December 2014.



* "A(H1N1) pandemic" refers to Influenza A(H1N1) pandemic.