

ORIGINAL ARTICLE: THE IMPORTANCE OF PROFESSIONAL TRAINING: EDUCATIONAL NEEDS, ASSESSMENT INSTRUMENTS AND INTERVENTION TOOLS

Psychosocial precursors of the correct sanitation and sanitization of the patient unit in the hospital setting

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Abstract. *Background and aim of the work:* Worrying data indicate the urgency of strongly limiting Health-care-Associated Infections (HAI). Therefore, according to the Theory of Planned Behavior, the psychosocial precursors of correct sanitation and sanitization were assessed. *Methods:* An Italian sample of hospital health workers (nurses, healthcare assistants, cleaners; N=250), replied to a validated questionnaire measuring: a) knowledge of HAI; b) favorable attitude towards the correct sanitation and sanitization procedure; c) perception that the management and colleagues give importance to the government of infectious risk; d) perception of being able to implement risk management behaviors; e) perception of having received proper training for the prevention of HAI. *Results:* The results show many mistakes about knowledge, the perception of insufficient specific training, and not always favorable attitude towards sanitation and sanitization practices. Workers also perceive that they can act the required behaviors and that the management of infectious risk represents a value in the group they belong to, but they believe that the management does not offer sufficient support. *Conclusions:* The improvement of the factors considered (knowledge, personal attitudes, actions of management and colleagues, perception of being able to implement the required behaviors) is affected by a proper training. This is one of the aspects on which management should invest more. (www.actabiomedica.it)

Key words: healthcare-associated infections; sanitation; sanitization; theory of planned behavior; attitudes; perceived behavioral control; infectious risk; hospital setting

Introduction

In health facilities, wherever care-provision procedures are in place, there is the risk of transmitting Healthcare-Associated Infections (HAI). Each day in the USA one hospital patient in 31 results to be the victim of at least one HAI and in 2015 there were estimated to be 687,000 HAI in the acute wards, even if in 2018 there was a decrease in the adverse events equal to at least 26% as compared with 2015 (1). In 2017 in Europe, 8.3% (11,787) of the patients admitted to

hospital for over two days inside intensive care units showed at least one HAI (2).

Handwashing by health professionals is the first form of prevention, recognised by all of the world literature of the past 60 years and is considered the most effective measure for the reduction of HAI. Also the cleaning and sanitisation activities of the health environments allow the hospital infections to be controlled. In fact, in the immediate vicinity of the patient the surfaces can be contaminated directly, by the patient, or indirectly, by the healthcare workers, causing secondary

transmission (3). The contaminated surfaces thus represent an important hotbed for cross-infection, in particular via the hands of the caregiving staff. Correct cleaning and disinfection practices are fundamental in the multiple interventions for the prevention of HAI, contributing to avoiding the patients' exposure to infective agents deriving from contact with people, with reusable devices and equipment, potentially contaminated, and with the inanimate environment in general (4).

Several studies (5, 6, 7, 8, 9) on the environment surrounding the patient (e.g. the bed unit), and the environmental sanitisation (e.g. hand hygiene, in relation to the HAI) suggest that by means of a greater cleaning the HAI transmission risk is decreased, and they underline the urgent need for further clinical testing, in order to develop methods finalized to the removal of the pathogenic agents of the hospital environment (7, 8). The use of standard procedures for hospital hygiene could provide further evidence for the fact that cleaning is an economic intervention for the control of infections caught in the hospital (5). The problem is that the surfaces are not considered critical factors (6), so they are rarely associated with the cross-transmission of infections to the patients (contact of the healthcare workers with a contaminated surface

or contact of the patient with contaminated surfaces or medical equipment). As regards hand hygiene, it emerges that the levels of compliance do not always result to be optimal. In particular, it has been observed that among the healthcare workers, compliance was 47% for the physicians, 75% for the nurses, and 59% for the ancillary staff (9). The values between patients and visitors were instead 56% and 57%, respectively. In the light of these considerations, it seems particularly important to understand which factors foster or not compliance with the safety standards. In particular, in order to comprehend the factors that favour or hamper the correct cleaning and sanitisation of the patient unit, psychosocial precursors of human behavior have been taken into consideration.

In accordance with the Theory of Reasoned Action (10), developed by Ajzen in the terms of the theory of planned behavior (11, 12), the attitude towards a specific behavior, the subjective norms resulting from social pressure insider the group of membership and the perception of control over behavior, are the main factors that contribute to determining the behavioral intentions that ultimately determine behavior.

Figure 1 reports the constructs of the theory that can be defined as follows:

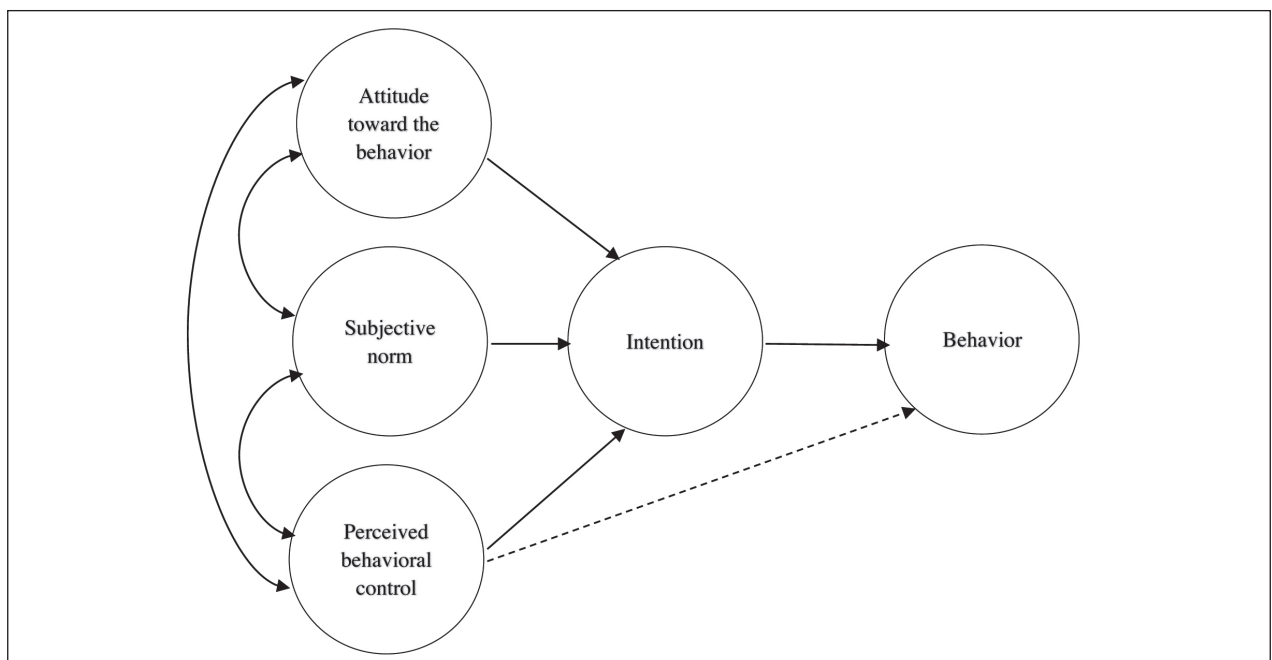


Figure 1. Theory of planned behavior

- The attitude towards the enactment of a specific behavior is considered a stable judgement, favourable or unfavourable, with a permanent and evaluative character. The Tripartite Model of Attitude (13) identifies an affective component (what is felt), a cognitive one (what is known) and a behavioral one (what is done).

- The subjective norms concern the perception that a given behavior is expected or not by the significant persons of the social context of membership. In it, for example, behaviors of adherence or violation of the norms are implemented with continuity, determining the intention to reiterate the same behavior. The socially expected and rewarded practices define the actual normative scope of a psychosocial nature.

- The perception of control of behavior, or perceived behavioral control, is the perception that a person has of being able to or managing to implement the expected behavior. In the theory of planned behavior, the perceived behavioral control influences the intention to enact a given behavior and the behavior itself.

Method

Aims

In the light of the previous considerations, the present study's aim was to measure, in a sample of health professionals:

1. The perception of having received or not relevant and specific training for the prevention of HAI;
2. The degree of knowledge of the procedure of cleaning and sanitization of the patient unit. For this purpose, the internal procedures present in the hospitals involved in this study have been inserted as literature references (14, 15, 16, 17);
3. The level of psychosocial precursors of the correct cleaning and sanitization of the patient unit, that is: the attitude, the socially expected and rewarded practices (by the management and the colleagues) that define the subjective norms; perceived behavioral control over expected behavior; the behavioral intention.
4. Also, the study aimed to assess the presence of correlations between the constructs taken into the examination (knowledge and psychosocial precursors

of the correct cleaning and sanitisation of the patient unit).

Sample

The participants in the study (see Table 1) were all health professionals in the hospital environment (nurses, healthcare assistants, cleaners), selected according to a convenience sampling within three Operative Units with different care intensities (Intensive Care, Internal Medicine, Digestive Endoscopy) of three Italian hospitals (Ente Ospedaliero "Ospedali Galliera" of Genoa, Azienda Ospedaliero-Universitaria "Ospedali Riuniti" of Ancona, Ospedale "Maurizio Bufalini" of Cesena).

The exclusion criteria for the participants referred to the insufficient knowledge of the Italian language, such as to invalidate the answers to the questionnaire, and/or to the fact of being healthcare workers undergoing training (e.g. students). On the grounds of the criteria identified an eligible population equal to 314 workers has been identified, in relation to 250 questionnaires filled out in a valid and complete way, with a response rate of 79.62%. The net prevalence of nursing staff out of the whole sample (about 70%), did not allow us to conduct disaggregated analyses for the different professions involved, owing to the disequilibrium of the subsamples

Measures

To safeguard the participants' privacy we decided to adopt an anonymous questionnaire, in which respondents were not asked to declare their sex and age, so that the subjects could be certain not to be identified, in the hope of encouraging a higher response rate and a greater authenticity of the replies.

For organisational needs the questionnaire was self-administered during working time.

The questionnaire, made up of 34 items, investigated:

1. The worker's level of knowledge on the topic of HAI, by means of a version reduced to 14 items of the "Questionnaire on the Knowledge of Hand Hygiene, for Health Workers" (18). The items from 1 to 3 were multiple-choice, with 4 alternative answers only

Table 1. Socio-demographic data of the participants

		TOTAL 250	CESENA 116	ANCONA 63	GENOVA 71
Profession	Nurse	174 (69.9%)	77 (66.4%)	48 (76.2%)	49 (69%)
	Healthcare ass.	35 (14%)	16 (13.8%)	8 (12.7%)	11 (15.5%)
	Cleaners	35 (14%)	23 (19.8%)	5 (7.9%)	7 (9.9%)
	Other	4 (1.6%)	0 (00.0%)	2 (3.2%)	2 (2.8%)
	Missing	2 (0.8%)	0 (00.0%)	0 (00.0%)	2 (2.8%)
Years of service	< 1	18 (7%)	5 (4.3%)	3 (4.8%)	10 (14.1%)
	1 - 5	38 (15%)	20 (17.2%)	9 (14.3%)	9 (12.7%)
	6 - 10	59 (24%)	31 (26.7%)	16 (25.4%)	12 (16.9%)
	11 - 20	69 (28%)	38 (32.8%)	19 (30.2%)	12 (16.9%)
	> 21	55 (22%)	19 (16.4%)	11 (17.5%)	25 (35.2%)
	Missing	11 (4%)	3 (2.6%)	5 (7.8%)	3 (4.2%)
Schooling	Primary	0 (00.0%)	0 (00.0%)	0 (00.0%)	0 (00.0%)
	Middle	33 (13.2%)	16 (13.8%)	6 (9.5%)	11 (15.5%)
	High	102 (40.8%)	49 (42.2%)	18 (28.6%)	35 (49.3%)
	University	101 (40.4%)	48 (41.4%)	32 (50.8%)	21 (29.6%)
	Missing	14 (5.6%)	3 (2.6%)	7 (11.1%)	4 (5.6%)

one of which correct (e.g. s. “what is the minimum time needed for an alcohol-based product to eliminate most of the germs on your hands?”). The other items were dichotomic, with a Yes/No answer (e.g. “which of the following behaviors should be avoided in that it is associated to the likelihood of bacterial colonization of the hands?”);

2. The presence of a favourable attitude towards the correct procedure of cleaning and sanitization of the patient unit, by means of 6 items (e.g. “using the correct procedure while I do my job is reassuring for me”) adapted from Ricci et al. (19, 20), with response modality on a 7-point Likert scale (from 1 “completely disagree” to 7 “completely agree”);

3. The intention to implement the correct clean-

ing and sanitisation procedure of the patient unit, by means of 2 items (e.g. “in the coming weeks I will use the correct procedure in the tasks I perform”) adapted from Ricci et al. (19, 20), with response modality on a 7-point Likert scale (from 1 “completely disagree” to 7 “completely agree”);

4. The subjective norms, defined by the perception that the direction attributes importance to the management of the infective risk (climate of protection determined by the actions of the management), by means of 3 items (e.g. “the management involves all the workers in decisions that concern the risk management of the HAI”) adapted from NOSACQ (21), with modalities of response on a 7-point Likert scale (from 1 “completely disagree” to 7 “completely agree”);

5. The subjective norms, defined by the perception that the group of membership attributes importance to the management of the infective risk (climate of protection determined by the actions of the peers), by means of 6 items (e.g. “the workers of the operative unit help each other to guarantee the correct procedure of environmental cleaning and sanitisation”) adapted from NOSACQ (21), with response modalities on a 7-point Likert scale (from 1 “completely disagree” to 7 “completely agree”);

6. The perception of being able to implement the behaviors for the management of infection risk (perceived behavioral control), by means of 1 item (“I have implemented adequate behaviors for the prevention and the control of the HAI, for my own and other people’ safety, without anyone having to remind me about it”) adapted from Ricci et al. (19, 20), with response modality on the 7-point Likert scale (from 1 “completely disagree” to 7 “completely agree”);

7. The perception of having received or not having received suitable and specific training for the prevention of the HAI, by means of 2 items created specifically for this research, with a dichotomic answer (yes/no).

In order to test the comprehensibility of the scales inserted in the questionnaire, we proceeded to submit a first version to the pilot study, by means of a) interviews with the members of the Hospital Infections Committee of each hospital included in the current research; b) administration of the questionnaire to three health professionals, not belonging to the Operative Unit included in the study. Following the pilot study we inserted, in the introductory part of the questionnaire, the definitions of cleaning, disinfection, sanitisation and the section relating to the worker’s knowledge of the issue of HAI.

Data analysis

The data collected were processed with IBM SPSS version 21. In the descriptive analyses the following were reported, respectively: mean, standard deviation, counts and percentages by continuous and categorical variables. The coefficient of two-tails Pearson correlation was used to measure the relationship between the variables taken into examination.

Ethical considerations

The study was conducted in accordance with the ethical principles for medical research that involves human subjects (Helsinki Declaration). All of the hospitals contacted authorised the present research and the participants’ anonymity was guaranteed.

Furthermore, before proceeding with the administration of the questionnaire: a) written informed consent was obtained from the participants of the study; b) a researcher presented the project to the Nursing Coordinator and provided the informative material to the professionals.

Results

The main results are presented hereunder:

1. The responses to the 2 items that investigated the perception of having received or not received suitable and specific training for the prevention of the HAI (see Table 2), show the following:

- Fewer than 50% declare they have received specific training on the subject of cleaning and sanitisation of the environmental surfaces, showing an evidently critical situation.
- Almost 75% of the sample express the need to receive further training on the subject, confirming what was evidenced in the previous item.

2. As regards the level of knowledge of the procedure of cleaning and sanitisation of the patient unit, the data have shown that:

- More than 70% of the participants show they do not know that the germs the patient brings with him/her are the most frequent sources responsible for the HAI;
- Over 65% of the professionals show that they do not know that touching the intact skin of the same patient is not an action that increases the infection risk;
- Over three-quarters of the sample show they do not know that touching the patient’s sheets does not increase the transmission risk for the patient him or herself;
- More than 50% of the professionals do not

Table 2. Specific training for the prevention of HAI

		TOTAL 250	CESENA 116	ANCONA 63	GENOVA 71
I received specific training	Yes	116 (46.4%)	46 (39.7%)	32 (50.8%)	38 (53.5%)
	No	122 (48.8%)	67 (57.8%)	27 (42.9%)	28 (39.4%)
	Missing	12 (4.8%)	3 (2.5%)	4 (6.3%)	5 (7.1%)
I need further training	Yes	184 (73.6%)	85 (73.3%)	49 (77.8%)	50 (70.4%)
	No	53 (21.2%)	27 (23.3%)	10 (15.9%)	16 (22.5%)
	Missing	13 (5.2%)	4 (3.4%)	4 (6.3%)	5 (7.1%)

know that regularly using hand cremes does not colonise one's hands, but is actually advised as a moisturiser when the alcohol-based gel is used regularly to disinfect one's hands.

3. The results relating to the psychosocial precursors of the correct cleaning and sanitisation of the patient unit are reported here:

- As regards the attitude, 30% of the professionals state they do not feel guilty even if they know they are not using the correct procedure;
- As regards the intention ("In the coming weeks I think I will use the correct procedure in the tasks that I carry out"), 18.4% of the professionals show scarce willingness to use the correct procedure in the tasks they will carry out.

As regards the subjective norms, deriving from socially expected and rewarded practices, both on the part of the management and on the part of the colleagues it emerges that:

- 51.6% of the professionals believe that the Management do not make sure that everyone has received the necessary information about the environmental cleaning;
- 48.4% of the participants in the study – the operators (121 out of 250) – state that the management do not sufficiently foster everyone's contribution to the management of the HAI;

- For almost 58% of the sample the management do not adequately involve the workers in the decisions that regard the risk of HAI.

As a whole, the measures relating to the perception that the group of membership attribute importance to the management of the infection risk (climate of protection determined by the colleagues' actions), show a mean value in favour of the execution of the correct procedure ($M = 5.86$, $SD = 1.08$).

As regards the item that measures the perceived behavioral control, in the execution of the correct procedure, the mean shows high values ($M = 6.25$, $SD = 1.12$).

4. The analyses relating to the correlations between the different constructs (Table 3), show that the highest level of significance ($p < .001$) is observable between: behavioral intention and perceived behavioral control; the subjective controls and the perceived behavioral control; behavioral intention and subjective norms; behavioral intention and favourable attitude towards the protection practices; perceived behavioral control and favourable attitude towards the protection practices. This confirms, as hypothesized by the theory of planned behavior, that all the psychosocial precursors of behavior result to be in a significant relationship with one another.

Instead there emerges a weak significant relationship ($p = .02$) between the level of knowledge and the favourable attitude towards the protection practice. That is, the attitude can vary weakly with the change

Table 3. Correlations between constructs (N=250)

		Knowledge	Attitudes	Subjective norms	Behavioral intention	Perceived behavioral control
Knowledge	Correlation	1	.149*	.034	-.075	-.046
	Sig. (two-tailed)		.019	.592	.238	.476
Attitudes	Correlation		1	.249***	.366***	.349***
	Sig. (two-tailed)			.000	.000	.000
Subjective norms	Correlation			1	.474***	.277***
	Sig. (two-tailed)				.000	.000
Behavioral intention	Correlation				1	.612***
	Sig. (two-tailed)					.000
Perceived behavioral control	Correlation					1
	Sig. (two-tailed)					

*. The correlation is significant at the level .05 (two-tailed).

***. The correlation is significant at the level .001 (two-tailed).

in knowledge and, vice versa, that the attitude has a slight influence on the level of knowledge.

Lastly, there is no significant relationship between: knowledge and subjective norms; perceived behavioral control and knowledge; knowledge and behavioral intention. Therefore, except for the relationship with the favorable attitude towards protection practices, knowledge does not seem to be related to the psychosocial precursors of behavior.

All of this leads to the belief that the knowledge of the protective practices is necessary, but not sufficient, in determining workers' actual behavior.

Discussion and Conclusions

In respect to the favourable attitude towards the execution of the correct procedure, it emerges that most of the professionals share the importance of its application, in order to prevent the infections correlated to assistance practices. However, the fact that 30% of the participants declare they do not feel guilty if they do not use the correct procedure warrants attention.

The results connected to the level of knowledge relating to the main source responsible for the HAI, the modality of infection transmission, the moment

of hand washing, to the use of alcoholic solution and the related timing, have shown a high percentage of wrongful answers, probably due to inadequate specific training.

Hence, it is deemed fundamental to set up initial training courses for all the newly hired staff (nurses, healthcare assistants, cleaning staff) and to cyclically provide further training. Although the correlation between knowledge and attitude is moderately significant, it is apparent that in any case the increase or the decrease in knowledge corresponds to a more or less favourable attitude towards the environmental cleaning and sanitisation. Worker training is often a complex challenge, but with the appropriate strategies it is possible to obtain an improvement in the awareness of the risks and the implementation of protective actions by the operator (22).

This research confirms the importance of investing in initial and continuing education, in order to improve the knowledge and to determine in the workers a greater presence of attitudes favourable towards the practices of environmental cleaning and sanitisation. The assuming of such practices as a value, and not merely as an obligation, is the cornerstone of a culture of prevention, that is what determines the subjective norms and the perception of being able to implement the actions laid down in the guidelines.

The data, moreover, lead us to believe that top management should invest more in the involvement of professionals at the informational, managerial and decision-making levels. Indeed, from the study it emerges that the procedures do exist, but that they are not always supported by the companies.

Also, seeing that the single correlations present between the different psychosocial precursors considered and taking account of the main critical aspects that emerged in regard to the perception that the management does not attribute importance to the management of the HAI, this factor should be acted upon as an element of activation of further consequential improvements.

In conclusion, the prevention of HAI is a priority in all health environments, the implementation of which requires the diffusion and the support of a culture of patient safety finalised to orienting the attitudes, the norms and the behaviors of individuals and organisations. The presence of such a culture is based, and increases, the taking of responsibility by all the staff and the managers to ensure the patients' wellbeing, by means of teamwork, collaboration and communication (23).

The adoption of the best practices at times encounters a certain amount of resistance, owing to the lack of awareness, scarce motivation for change, limits to organisational culture, difficulties in the implementation of new guidelines.

However, a learning organisation must support its own members so that that can improve together and enhance the capacity to achieve the desired results, by means of more efficacious working methods (24).

For this purpose, it would be useful to share information on HAI with all the staff; encourage the workers to take part in the formulation of policies and procedures to reduce the HAI; provide training by applying the principles of adult learning (23, 25).

Lastly, it is believed that future research should investigate the real repercussions of the constructs considered on actual behavior on the job by means of an observational study. This would contribute to clarifying the aspects that contribute to determining the adoption of behaviors to safeguard the patient.

Conflict of interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article

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